Building a national vision for spatially enabled land administration in Australia

Wallace, Jude; Williamson, Ian; Enemark, Stig

Published in:
Sustainability and land administration systems

Publication date:
2006

Document Version
Publisher's PDF, also known as Version of record

EXPERT GROUP MEETING ON INCORPORATING SUSTAINABLE DEVELOPMENT OBJECTIVES INTO ICT ENABLED LAND ADMINISTRATION SYSTEMS
9-11 November 2005, Centre for Spatial Data Infrastructures and Land Administration
The University of Melbourne, Australia.

BUILDING A NATIONAL VISION FOR SPATIALLY ENABLED LAND ADMINISTRATION IN AUSTRALIA

Jude Wallace, Ian Williamson and Stig Enemark
Senior Research Fellow, Centre for SDIs and Land Administration;
Director, Centre for SDIs and Land Administration
Head, Department of Geomatics, University of Melbourne;
and
Vice-President of International Federation of Surveyors,
Head, School of Surveying and Planning, Aalborg University, Denmark

SUMMARY

This article provides a sketch of the key issues stemming from the Expert Group Meeting attended by European and Australian experts. It is the first step in building a national land administration vision and is influenced by empirical research on European and Australian approaches to Land Administration Systems. The vision is especially influenced by three trends in global land administration theory and practice, especially during the last five years and include: sustainable development; spatial enablement; and Australian achievements in land administration.

The challenges for modern land administration systems and in modern government are presented including implementing and understanding regulations and restrictions, and changing the nature of ownership. The role of spatial enablement and understanding the potential of *iLand*, the concept of integrated spatially enabled land information available on the Web, are central to understanding the national vision for land administration in Australia. Finally, future directions within technical and operational issues and collaboration and capacity building are presented which build on the outcomes of the EGM and lead into the creation of a new land management model and national vision for spatially enabled land administration.

INTRODUCTION

This article is prepared by the research team for the Project, *Incorporating Sustainable Development Objectives into ICT Enabled Land Administration in Australia*. It builds on the findings from the Expert Group Meeting, of 9-11 November, 2005 held in Melbourne and attended by European and Australian experts. The article is the first step in building a national land administration vision and is influenced by empirical research on European and Australian approaches and their differences. The vision is especially influenced by three changes or trends in global land administration theory and practice especially during the last five years. These are -

1 Sustainable development objectives within land management
2 Spatial enablement technologies
3 Achievements in land administration in Australia.

RESEARCH CONTEXT

The project required a review of land administration trends in developed and undeveloped countries, understanding the issues identified by national and international agencies, and reviewing the trends in information and communication technologies. Background research and the case studies in Denmark, German, The Netherlands and Switzerland in Europe and Victoria, New South Wales and Western Australia in Australia, revealed a much larger capacity for land administration systems (LAS) to service government and deliver sustainability than that identified in existing literature. This was principally because of significant improvements in technological opportunities and a much more practical approach to sustainability issues. The ingredients of this modern context are identified below.

CHALLENGES FOR MODERN LAND ADMINISTRATION SYSTEMS

Sustainable development

Sustainability is the agreed goal for national governments. The 'triple bottom line' of *economic*, *environmental* and *social* sustainability is now expanded with the inclusion of *governance* standards to ensure institutional and corporate ethical performance in the longer term. Implementation of 'quadruple bottom line' sustainable development requires combined activities across the whole of government, private sector and citizens. Careful management of land related activities on-ground, in organisations and in government is crucial for delivery of sustainability. New technologies offer opportunities for reorganisation of land related activities and delivery of targeted land information for government and business decisions to deliver sustainability.

The land management paradigm

Land management is a phenomenon of all societies and underpins distribution and management of their largest asset: their land. For Western democracies with highly geared economies, land management, with a central land administration component, is a major activity of government and the private sector, the foundation of highly geared land markets and delivery of land. The land management paradigm below allows everyone to understand the *sphere of the central land administration component* and how these institutions relate to the historical circumstances of a country and its policy decisions. The paradigm also provides a stable focus for comparison and sharing of national, regional and

international efforts to manage land. More importantly it provides a framework to facilitate the processes of integrating new needs into traditionally organised systems without disturbing the fundamental security these systems provide.

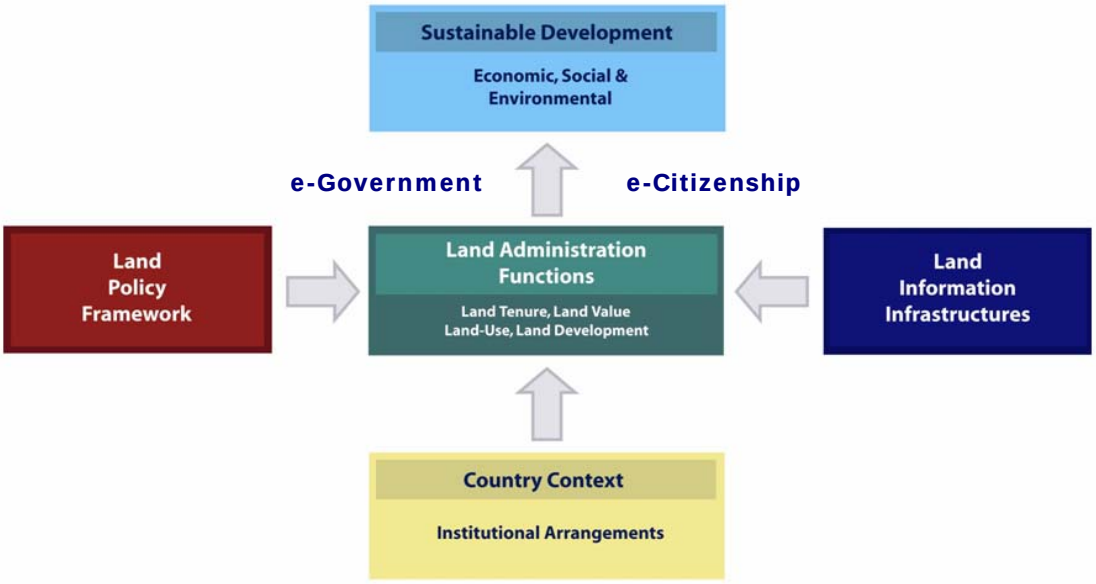


Figure 1 - The land management model (Enemark, Williamson and Wallace, 2005)

Integrated land management

No nation can build land management institutions without thinking about integration of activities, policies and approaches. Cost and overheads of technology provide additional motivations. The rise of new spatial technologies offers exciting opportunities for new approaches. The question facing modern land administrators is then how to proceed to the future.

Land administration

Land administration systems (LAS) started because governments needed coherent and fair tax collection systems, then they developed to service land markets. Their basic functions are to organise land tenures, values, uses and development. Their primary tools are surveying, registration systems, and databases run by government organisations. Land administration systems are now unrecognisable in terms of their antecedents and are highly administrative and technical.

Land administration is now a multi discipline endeavor with a focus on land management, delivery and organisation; it is also providing the supporting framework for trading in complex commodities. An analysis of how modern land markets are able to invent and support a constant stream of new commodities shows how fundamental infrastructure in the prosaic activities of tenure, use, development and value underpins these wealth accelerating activities (Wallace and Williamson, 2006).

The cadastre

For Australians, the cadastre is a new, but simple to understand, concept: it is a map of the parcels and land arrangements now available in digital form in computers showing how a society organises its land into useable pieces with interconnecting roads and services (Figure 2). It was developed by digitising the old paper survey plans and maps, making them fit, and by generating new parcels through much more accurate modern processes.

Fitting the old records with the new is ongoing and varies in each system. In Europe cadastres are much older and their functionality is much more extensive. Their age makes them understandable to their communities and they include much more information, including buildings.

The cadastre is at the operational core of land administration systems. Modern digital cadastres are much more central to modern governments because they allow computers to accurately identify where a feature, such as a street or a house, is on the globe. They therefore change computerised data into intelligible, people-friendly information and present it in visual (picture) formats. By adding geocoded addresses, cadastres can show how parcels of land are arranged into properties and businesses. Imposing aerial images (photos or satellite images) in the equivalent scale allows people to look up pictures of their homes and farms to show current and historical uses. In some jurisdictions, cadastres are survey accurate (ACT, south western Western Australia, in urban and peri-urban New Zealand). In others (Victoria, NSW), they are generally not. For Australia, the necessity of survey accuracy in the cadastre is frequently debated because it is expensive, relative to our land mass. In Europe, the long history of surveying, meticulous standards of on-ground surveying, public respect for and understanding of surveying and close density land uses have long ago ended the debate. For high value land, survey accuracy in the cadastre is a national asset.

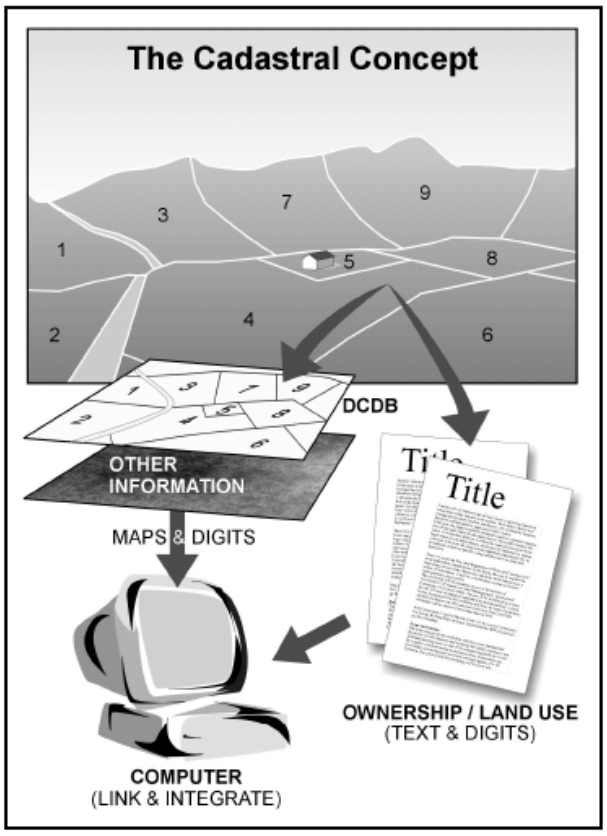


Figure 2 – The Cadastral Concept

The unique capacity of cadastres to provide the people friendly layer of land information makes them the layer that no modern land administration system can do without. They are nevertheless expensive to build and to maintain. This is why they must be "built once, and used many times". They must also be cleverly designed to meet the needs of modern governments concerned about sustainable development.

Changes in land administration

Since 1990, land administration in modern democracies emerged from a technical focus to engage professionals from the disciplines of engineering, economics, political and social sciences, law and computer technology as international organisations and national governments struggled to deliver land and food security and to build land markets.

The most important changes in LAS were driven by technology, principally the move from paper records to computerised systems. In future, geographic information systems, spatial data infrastructures, multi-purpose information, alignment of information about the built and natural environments, and layering of aspatial information with the stable framework of location data will create new opportunities.

In creating this dynamic new future, the previous concentration on institutions of government will be widened by engagement of utilities, spatial scientists, and other businesses in the construction of land information products. The transitions are shown in Figure 3 below.

Figure 3 - IT in LAS

This figure shows a potential future for modern land administration, called *iLand*. It emphasises the dynamism in people to land relationships that need much more modern management tools and approaches than the standard land administration approaches built in the days of relational data bases and small capacity computers. Given the technological trends, governments are moving from web enablement of information needs, to *eLand* where information is much more interoperable, accessible, and where services and processes are managed in the internet environment. *iLand* takes this to the next stage in which government organisation of processes and information utilises the new and emerging technologies in spatial recognition. *iLand* requires a comprehensive approach to using spatial enablement throughout government, and especially in land administration tasks, similar to that shown in Figure 4 below.

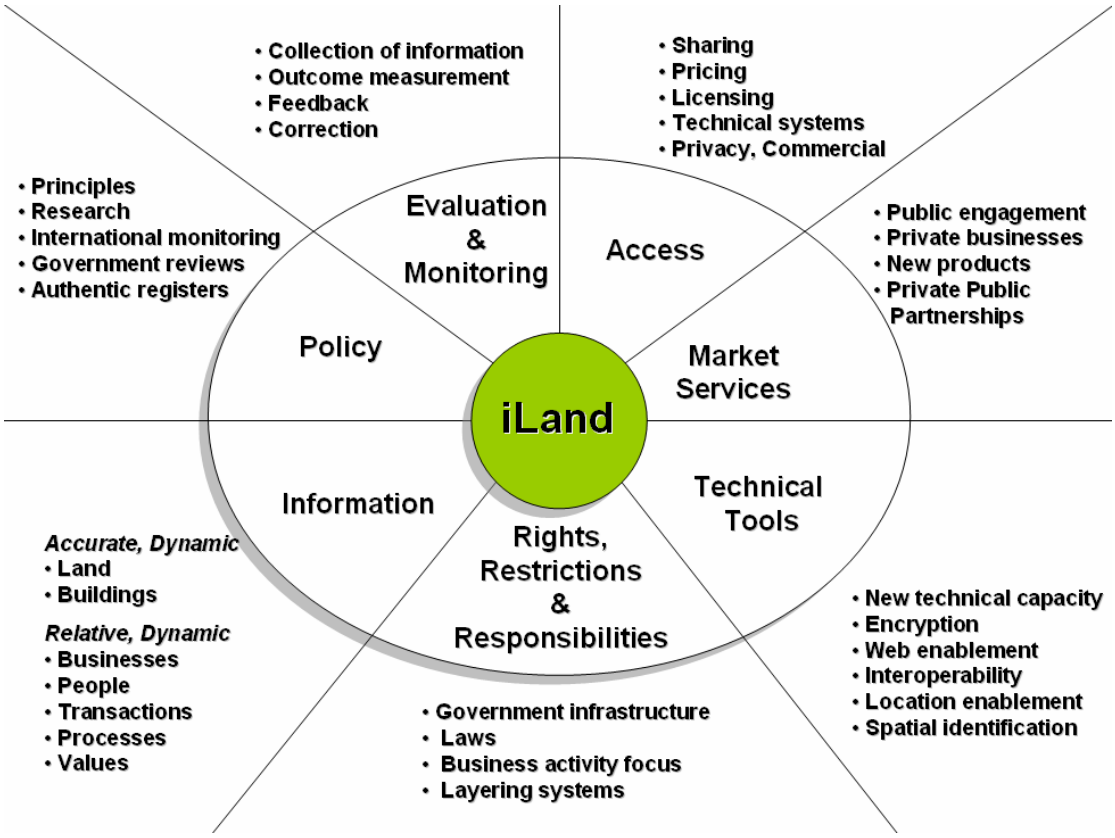


Figure 4 - The *iLand* vision

The *iLand* vision is where government information systems are spatially enabled, and the "where" or location provided by spatial information is regarded as a common good made

available to citizens and businesses to encourage creativity, efficiency and product development. This makes spatial information, which describes the *location* of objects in the real world and the *relationships* between objects, into both an enabling technology and an enabling infrastructure for modern society. While relying on the technical skills of the professionals in the computer world, and the experts in land identification in surveying and geography, *iLand* essentially services the needs of everyone else, including governments as they seek to implement land policy and deliver sustainability. The current issues facing government identified below will be much better addressed by this infrastructure.

CHANGES IN MODERN GOVERNMENT

Implementing and understanding regulations and restrictions

Land uses over time must be managed to mitigate long term deleterious impacts. Australian problems of erosion, salinity and acidity are documented. Over time, attempts to manage these shared impacts by regulating tree clearance, water use, chemical use, building standards and so on led to very great increases in the amount of law, regulation and standards applying to land based activities. This is a world wide experience. Calls for inclusion of restrictions on land in LAS and transparency of government are common and international. Australian examples are evident at parliamentary levels. The idea of including "all restrictions in the land register" was a first-grab solution. New technology now offers more alternatives. Modern registries are adapting to integrate these new opportunities into their traditional functions.

Changing the nature of ownership

Nations are building genuine partnerships between communities and owners, so that environmental and business controls are mutual endeavors. Rather than approach them as restrictions, the nature of ownership is redesigned to allow owners opportunities within a framework of responsible land uses for delivery of environmental and other gains to all. The Australian mining industry provides typical examples of collaborative engagement of local people, aboriginal owners and the broader public. The National Water Initiative and the National Land and Water Resources Audit build in the realisation that activities of one land owner affect others. The development of market based instruments (MBI) such as EcoTenders is an Australian attempt to build environmental consequences into land management. Australia's implementation of "unbundling" of land, to create separate, tradeable commodities is now strongly established. These separate commodifications of land based opportunities are built into existing land administration systems as far as possible, but no comprehensive analysis of their impact on property theory is available.

For the Europeans, the social responsibilities of land owners have a much longer heritage, with the exemplar provision in the German Constitution insisting on the land owner's social role. The nature of land use in The Netherlands, given 40% of the land mass is below sea level, presupposes high levels of community cooperation and integrates land ownership responsibilities into the broader common good. The long history of rural villages in Denmark and public support for the 70% of Danes who live in rural areas also encourages collaboration.

Whatever the mechanism, modern land ownership has taken on social consequences, at odds with the idea of an absolute property owner. Australia and Europe approach and manage the social nature of land in very different ways. While Europe is generally approaching land management as a comprehensive and holistic challenge requiring strong government information and administration systems, Australia is creating layers of separate

commodities out of land and adapting existing LAS as much as possible to accommodate this trading without a national approach.

New trading commodities – unbundling land

Demands on traditional systems increase when commodification (or commoditization in the US) is extended beyond land ownership. In Australia, the process is known as "unbundling" – separation of the new tradeable products separate from interests in land itself. Biota, carbon credits, planning and building permissions, and water and others require similar infrastructure to permit trading. In some cases, the new product is integrated into existing land registration programs, or into similarly designed systems.

From the European perspective, where unbundling is unfamiliar, the important issues are to retain and extend capacity to deliver sustainable development within these separated markets and to provide administrative frameworks which permit holistic management of the nation's most valuable resources.

Building cognitive capacity and competencies

Engagement of beneficiaries in modern land markets requires high levels of understanding about and trust in activities, products and services. The ability of a nation state to provide administrative systems that achieve public confidence in the operations of land markets is relatively rare. Only about 30 nations of the world do this very well. Achievement of trust and education of participants in land markets is the unrecognised but remarkable outcome of land administration in Australia and Europe. In terms of delivery of good governance and civil peace, the comparison between societies in these countries and others in the world is stark.

The capacity of LAS to deliver services which feed back into the democratic functioning of their nations needs to be recognised. The public role of LAS is often forgotten, despite the importance of this consequence of effective administration.

Equitably and efficiently taxing land and collecting relative land information

All developed countries rely on land driven taxation streams. Vigorous land markets and the development of complex commodities require much more sophisticated systems of land taxation, stamp duty on transactions and ownership taxes. These systems depend on information about individual owners, times of purchase and sale, values and prices on purchase and sale, expenditure during ownership, trust interests, land uses, and other variables. While the core information is the unchanging information about the land parcel, governments now rely on a range of additional information that is highly varied and relative to situation. This relative information is the key to land tax, income tax, capital gains tax and goods and service tax activities; and to national welfare systems. The collection and maintenance of this information currently depends on self reporting and database organisation. However, new opportunities exist for spatially enabling systems to assist management of relative land information.

Supporting complex markets

Insurance, corporation and banking operations in nation states developed separately from land administration. This was understandable, given the history of paper based land administration systems. However the computerisation and spatial enablement of land registers, cadastres and related information (valuation, planning and buildings and development activities) create far more opportunities to build information systems capable of servicing these other essential commercial spheres. In European countries land registration systems provide much more information to mortgage providers than is occurs

in Australia. Capacity to provide information to the insurance industry is also underdeveloped.

Managing permissions and licences

Government management of and assistance to business has increased since WWII. Information needed by business and the public includes permissions, licences and approvals as well as restrictions. A georeferenced business address file, corporate operating and registered offices, business types and licences is already under consideration in Australia in the Public Sector Mapping Agency (PSMA). Australia's capacity to service local business is recognised as high and the nation does well on regulatory comparative analysis (World Bank Report, 2004).

Improving participation by business and citizens

State, territory and local governments increasingly provide information about planning initiatives, citizens facilities and other activities electronically, through initiatives generically called eLand. Nationally, the Australian government increasingly uses Web based systems to provide services in taxation, welfare, and information.

The major Australian effort in *eConveyancing* is a fundamental change from mere delivery of information central to *eLand* initiatives, to interactive service provision across sectors of land administration and banking via the Web. The change is potentially as fundamental as Internet Banking was to the banking sector. This pioneering change reflects wider government use of the Web to inform and engage citizens in decisions.

Australian land management has multiple examples of interactive land management programs, with Western Australian shared land information platform, SLIP, in the Department of Land Information, providing an exemplar example. CSIRO, GeoScience Australia and PSMA provide highly successful examples of programs, indicating imaginative and collaborative digital solutions to information and service problems.

SPATIAL ENABLEMENT

Understanding the potential of *iLand* and spatial enablement requires an appreciation of how spatial enablement works. On one standard, spatial enablement is just one form of interoperability. It is however far more energetic and offers opportunities for visualisation, scaleability, and user functionality. The capacity of computers to place information in on-screen maps and to allow users to make their own enquiries has raised the profile of spatial enablement. Thousands of new applications of this technology (mobile phones, vehicle tracking, digital cameras, and intelligent systems in asset management) are developing annually. These rely on the underpinning of spatial information in cadastres and large scale topographic maps (such as the large scale topographic map of The Netherlands).

The benefits of spatial enablement of the core cadastral layer are -

- Maintenance and sharing of the core information layer – once created it is used many times – already used in thousands of applications
- Attachment of information to images of parcel and property configurations
- Accurate identification about the place or location of one activity in relation to other places in ways that are understandable by ordinary and non-technical people
- Capacity of businesses and citizens to understand, interrogate and manipulate information in the computer
- Inclusion of layers of geo-referenced information in the computer systems, despite their distinct sources, systems and owners, and achieve interoperability between the layers

- Integration of government information systems, such as SmartTag of the Victorian Government
- Provision of seamless information to institutions and government
- Incorporation of aspatial and relative information into maps permitting the location of that information to be realised and visualised
- Ultimately managing information through spatially enabled systems, rather than databases.

Spatial enablement offers land administration a revolution equivalent to the conversion of paper files to digital systems of twenty years ago. The concept of *iLand* was developed to assist people to understand the capacity of spatial information to deliver new services and to assist better land information management. *iLand* will be a central component of new land administration systems.

FUTURE DIRECTIONS

These contextual influences, particularly unbundling land and water interests and development of complex commodities, put new pressures on Australia's LAS framework, both conceptually and institutionally. Simultaneously, new technologies for organising information, visualising information and allowing users to build their own versions of systems to suit personal needs will impact on organisation of geospatial and georeferenced information and its source agencies. The core activities of land registration, planning and valuation will have more significance than ever before. Taking into account the views of international and Australian experts in the Expert Group Meeting, specific directions for the future are summarised below.

Issues in sustainable development

The extensive use of ICT in LAS will not automatically lead to sustainability. Whole of government approaches are needed. The most crucial factor in delivery is the cultural understanding of why sustainability is important and general agreement on how to achieve it. To achieve a comparative international focus, reflecting the cross-jurisdictional nature of sustainability issues, an agreed model or paradigm of land management was proposed and critically reviewed. The key ingredient, country context, highlighted the largest observable differences between modern European democracies and Australian counterparts.

The European approach to land is based on social responsibilities of individual land owners. The owners are regarded as temporary managers rather than absolute owners. Australian efforts focus on economic tools (especially "unbundling" of interests in land) while Europe focus on holistic management for inter-generational sustainability and for maintenance of a strong and dedicated rural population charged with land management responsibilities. From the European perspective, Australia needs inter-jurisdictional capacity for holistic management, especially because of the scales of challenges, sparsity of its populations, and hence very limited human capacities. Technical solutions are even more essential to compensate for the relative thinness of people skills.

Australia has a special advantage in that issues of marine management have stimulated a regional approach to marine cadastre as a management tool for the Asia Pacific region. While it was not a focus, it is paramount importance for Australia. Similar inter regional approaches feature in Australia's treatment of water scarcity and quality issues.

Professional, organisational and government issues

Europeans use parliaments to create land policy for citizen implementation and in contrast to Australia where governing parties and high level bureaucrats predominate in policy identification and implementation. Europeans are used to protracted, discursive and participatory processes in policy articulation and implementation. The extended role of surveyors in Europe reflects the social value attached to land and related professionals. Surveyors and spatial engineers are among the leaders in national and regional land policy making and, as a result, national LAS institutions have clearly defined international roles.

The influence of the European Union as a coordinating agency is evident and has no Australian equivalent. EUROGI and INSPIRE are significant influences on national policy, institutional functions and selection of instrumental tools. Agricultural sustainability is a strong political, social and economic driver in Europe, understood by urban and rural populations. Cultural absorption of key LAS tools, particularly surveying and the cadastre, and the much broader information base in cadastres, make it easier for Europeans to move into spatial data infrastructures, SDI, than Australians.

The engagement of senior policy makers in LAS is therefore more difficult in Australia with its constitutional rigidities and three-tiered government structure. Despite this, Australia has made significant national and international advances in the field. Leadership, so essential in shaping the future, is available. the Prime Minister's research priorities (5 December, 2002) identify spatial information as one of the new economic drivers The role of the private sector in driving spatial information awareness is evident and increasingly recognised (in NSW, for instance, by being included within the regulatory framework). The work of the inter-jurisdiction and national agencies is well known and creating significant opportunities for both government and private sectors. Of these, GeoScience Australia, PSMA, and CSIRO have acknowledged records. Initiatives among the traditional agencies are also significant: *eConveyancing* would not proceed without national cooperation among the registries and banking sector.

Encouragement of private sector engagement in the social and environmental, in addition to economic, aspects of sustainability by spatial industries is needed. The much broader role undertaken by land policy experts and surveying professionals is demonstrated by their work in international land projects, especially in developing countries. This record is relatively unknown. However, these efforts have identified new land administration tools for better deliver sustainability in the absence of established institutions. These new tools rely on social assessment, adjudication of disputes, and participatory record keeping systems using images rather than formally defined cadastral parcels. They provide interim measures which analogously can be applied by highly developed economies in management of new commodities.

The Australian academic research heritage is also significant. The Centre for Spatial Data Infrastructures and Land Administration at The University of Melbourne has relied for a decade on project funding from state and federal governments for innovative and successful LAS and technical research. Much of the future design and identification of suitable technological innovations for government use comes out of these research activities. In contrast, the European LAS institutions themselves provide significant leadership in future design, backed up by academic influence and activities.

Technical and operational issues

The language of technical discussions substantially inhibits understanding among non-technical people. While land administration is now clearly multi-disciplinary, it still

operates in a world of closed semantics. Meanwhile, efforts aimed at creating data models and "authentic" registers (national scale registers for people, businesses, properties, vehicles and so on) need much wider support.

In this environment of language and communication issues, the achievements in new technologies are important. These achievements can increase the level of political and public interest in LAS and its possibilities. Australia's significant achievements, such as SmartTag of Department of Sustainability and Environment in Victoria and the geo-coded national address file (GNAF), result in a much wider audience.

At the same time, more technical and less understood initiatives remain essential. Of the many now being investigated in Australia, cadastral modelling as a universal method of facilitating data interoperability, including 3D (height) and 4D (time) dimensions, offers potential for seamless presentation of land information.

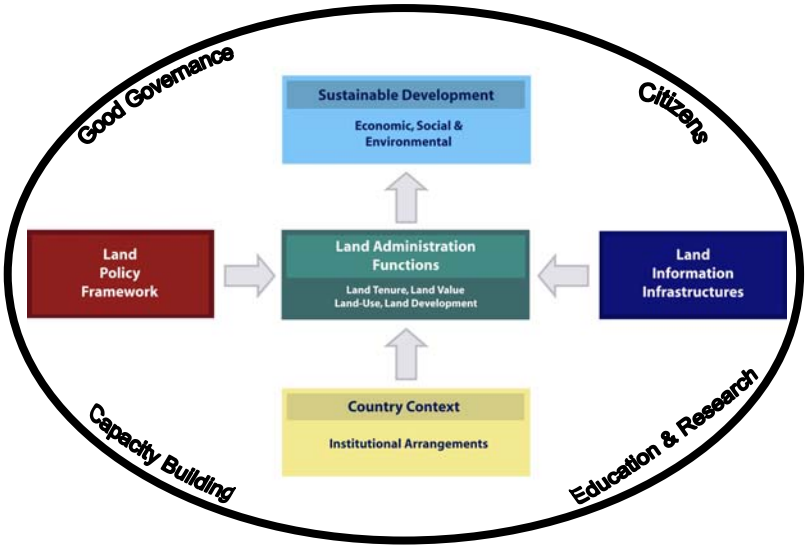
The missing link: the public

Given the need to demand drive, (that is respond to users' needs) rather than supply drive, change, engagement of the public in the decision process is essential. Sometimes a network of appropriate people through reference groups, or engagement of stakeholders in decision processes, is appropriate. Meanwhile, identifying new business needs as change drivers produces publicly satisfying results, as the Western Australian SLIP program demonstrates.

Australia has not yet introduced comprehensive monitoring and evaluation of its efforts to deliver sustainability, though the National Land and Water Resources Audit uses a national monitoring and evaluation framework. Though Global Reporting Indicators (GRI) are available, their systematic implementation in LAS does not occur in the state and territory jurisdictions. In the GRI environment, engagement of the public is axiomatic. To incorporate this wider perspective, the next stage of the paradigm is represented in Figure 5 below.

Collaboration and capacity building

Collaborative and collegiate exploration of the future paths is necessary. While Europeans enjoy considerable opportunities for these activities, Australia offers fewer forums. Those that exist, such as the annual conference of Registrars of Title, and professional group meetings and conferences are invaluable and successful. But more opportunities for structured and broad-based collaborative efforts are needed.



- **Land**: holistic term including property as an asset and natural resources
- **People**: interact with land administration system through rights restrictions and responsibilities
- **Sustainability**: facilitated through good governance in LAS
- **Innovation**: achieved through continuous monitoring and evaluation

Figure 5 – Next stage of the Land Management Vision

CONCLUSIONS

Meanwhile, while LAS functions of land registration and tenure, valuation, planning and development, are the institutional core of successful economies, these functions will undergo changes as they adapt to the new policies of sustainable development, demand driven processes, acceleration in take-up of spatially enabled systems, and the historical and cultural realities. The influences are graphically described in the figure below. How a particular jurisdiction responds will depend on the understanding of the vision by its leaders. The diagrammatic presentation of a land management vision that incorporates the new land administration model below (Figure 6) was developed out of the Expert Group Meeting's work.

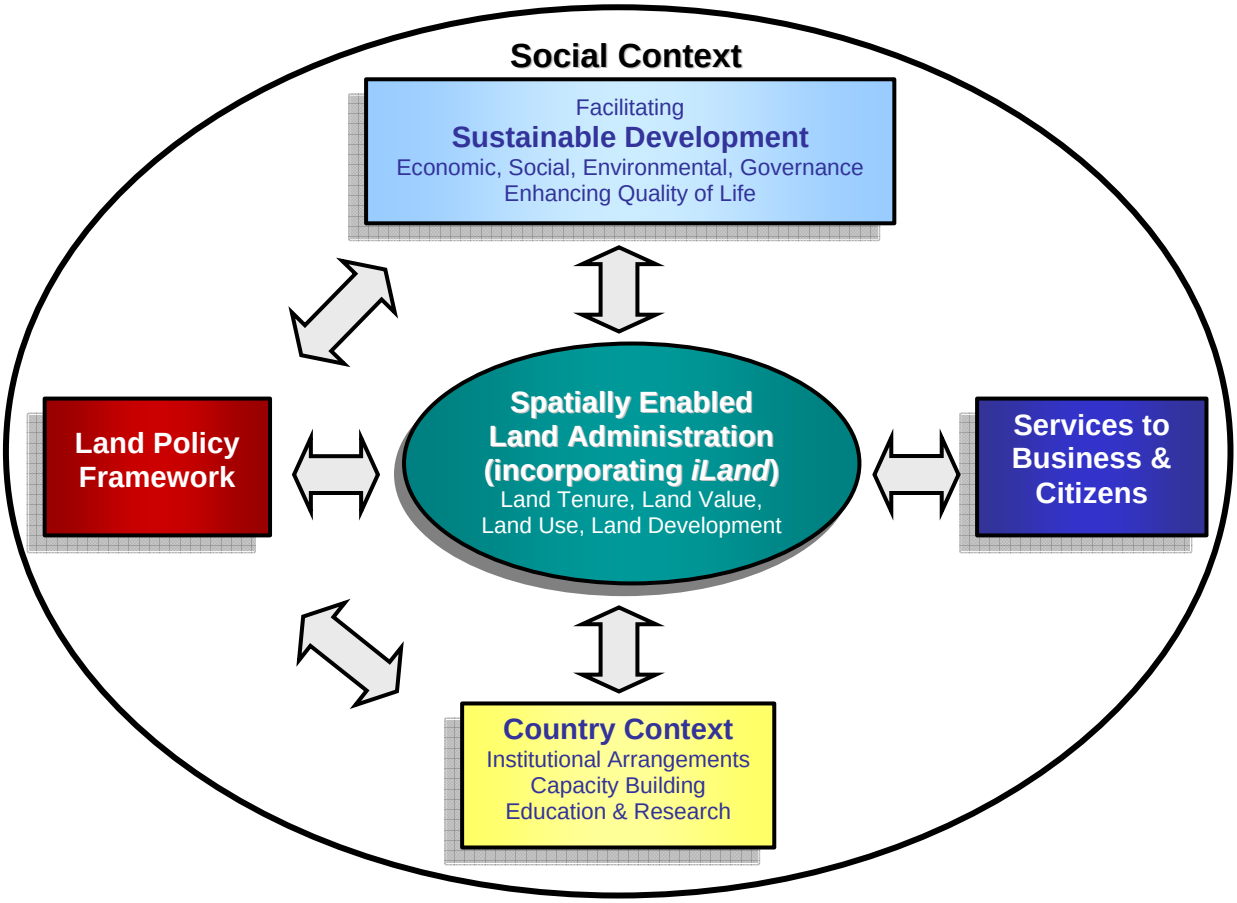


Figure 6 – Land Management Vision

The idea is that spatial enablement of land administration systems managing tenure and registration, valuation, planning and development will allow the information generated by these activities to be much more useful – in other words *iLand*. First, the achievement of sustainable development goals will be easier to evaluate. Adaptability and useability of modern spatial systems will encourage much more information to be collected and made available. The map-mashing trend following Google Earth and other major international applications shows a high public take up and popularisation of spatially enabled systems. For governments, building a suitable land policy framework will be assisted by better information chains. The services available to private and public sectors, and to community organisations should commensurably improve. Ideally these processes are dual: with modern information and communication technology, the engagement of users in design of suitable services, and the adaptability of new applications should increase and mutually influence. The global initiatives are the starting point, but in a national case, modifications to suit the particular context will be built.

The new land administration systems of the future will be local, regional and global in their capacity.

ACKNOWLEDGEMENTS

This article is part of a large project called "*Incorporating sustainable development objectives into ICT enabled land administration systems*", and is supported by the International Science Linkages programme established under the Australian Government's Innovation statement Backing Australia's Ability, and by the Department of Sustainability and Environment in Victoria, the Department of Land Information in Western Australia

and the Department of Lands in New South Wales. It draws on the collegiate creative efforts of staff, students and professionals engaged in and supporting the Centre for Spatial Data Infrastructures and Land Administration, Department of Geomatics, University of Melbourne. Any errors and infelicities are entirely the authors.

REFERENCES

Enemark, S., Williamson, I. and Wallace, J. (2005), "Building Land Administration Systems in Developed Economies", accepted for publication in Journal of Spatial Science, December issue.

Wallace, J. and Williamson, I. (2006), "Building land markets", Journal of Land Use Policy, (publication pending)